ESTIMATION OF MORTALITY USING CHILDREN EVER BORN AND DEAD

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Abstract

The data used in the estimation of mortality was from the 1998 house hold survey conducted by Federal Officer Statistics on children ever born and children dead as contained in the Nigerian Demographic and Health Survey (NDHS). Bass-Truseel variant was used to estimate multipliers K(i) and the United Nations Indirect Techniques was used to estimated the reference period. The party's pi/p_2 and p_2/p_3 are 0.2072 and 0.5682 respectively. The level of mortality (LM) one year before the survey among women aged 15- 19 was 19.6 which correspond to 1997. the level of mortality among women aged 20-24, 25-29,30-34, 35-39, 40-44 and 45-49 are 16.6, 16.1, 15.9, 16.0, 15.7 and 1.8 respectively. These correspond to the years 1996, 1992, 1991, 1989, and 1983 respectively. The trend of the mortality is fluctuating because of the different probabilities of dying among the age groups. The levels are in conformity with the law of mortality pattern that dead are higher at the two extreme ages 15-19 and 45-49 years.

Introduction

The importance of estimating current levels and future trend of mortality for planning and policy formulated can be over-emphasized. Such as exercise will help in evaluating the quality of data collection which will consequently, throw light on the types of data required. However, the statistical systems in Nigeria have not always produced reliable data through the traditional means of civic registration (Economic Commission of Africa, 1988). As a result, demographers have increasingly depended on *indirect* techniques of estimating vital parameters.

It is well known that the proportions of children who have died are indicators of child mortality and can yield estimates of childhood mortality. The births to a group of women follow some distribution over and the time from birth is the length of exposure to the risk of dying of each person. The proportion of children dead among the children ever born by a group of women will therefore depend upon the distribution of the children by length of exposure to the risk of dying and upon the morality risk themselves.

Child Mortality Estimation from Unconventional data

Data can report of women concerning their live births and the sequent survival of those children are utilized to estimated mortality rates. In its simplest form, the technique requires the total number of children ever born and the total number surviving among the ever born classified by age of the number at the time of census or survey. Methods have been developed, first by Brass (1964) and subsequently by Sulliam (1972) and Truseell (1975), to concert the proportion of children dead reported by women of age group into probabilities of dying, q(i) before childhood age (i) Ideally, to estimate (i) and q(i), one would like to identify a group of children at birth, follow them for 1 years and see how many fail to survive. But this direct method is impossible to achieve in Africa because of the reasons given earlier. Therefore, the Brass technique circumvents the problem of following a cohort of births by developing an ingenious method of converting a mortality statistics A(x), the proportion of children dead among ever born to women of age x into a probability of dying before age I, q (i). Since the children of mothers who are women of age x are not of the same age I, the proportion dead, A(i), is a composite of child-mortality levels. Brass's technique is therefore, essentially the development of a multiplier that will convert A(i) to q(i).

Brass developed a procedure for converting proportions of children dead among children ever bom reported by women in age groups 15-19, 20-24 etc, into estimates of the probability of dying before attaining certain childhood ages. Following the notation in the literature and using the symbol $A(i)$ to denote the proportion of children dead among children ever born to women in successive five- year age groups (where I = 1 signifies age group 15-19, I =2 denotes 20-24 etc). Brass developed a procedure to convert $A(i)$ values into estimates of $q(x) = 1.0 - l(x)$ the probability of dying Brass is $q(x)$
$—k(x)\ A(i)$, where the multiplier k(x) is meant to adjust for non mortality factors determining the value of

A *(i)*.

Brass found that the relation between the proportion of children dead, A*(i)* and a life table mortality measure, q(x) is primarily influenced by the age pattern of fertility because it is this pattern that determines the distribution of the children of a group of women by length of exposure to the risk of dying. He developed a set of multipliers to convert observed values of A*(i)* in to estimates q(x), the multipliers being selected according to the value of p(l)/p(2), a good indicator of fertility conditions at younger ages, where p(i) is the average parity of average number of children ever born reported by women in age group i..

Palloni (1986), developed coefficients that helped investigators to compute multipliers that help to convert proportions dead among children ever born by age of mothers to probability of dying before exact ages 1,2,3,5,10, etc. for this paper, the Trussel Variant was used to estimate the multipliers k(I) and the reference period.

Application of the Children Ever Born/Children Surviving to Estimate Children Mortality

The data here were the Demographic and Health Survey of house holds (1998), classified by age group of mothers, children ever born and dead.

Computation Procedure:

Step 1: Calculation of the Average Parity Per Women.

Parity *p(i)* refers to age group 15-19, *p(2)* to 20-24 and *p(3) to 25-29.* In general *p(i) = CEB (i)/ FP{*I), where *CEB(i)* denotes the number of children ever born by women in age group *i*, and *FP(i)* is the total female population in age group *i* irrespective of their marital status.

Table 1: Number of Women, Children Ever Born (CEB, and Dead Reported During the Household Survey.

Ape Group	*i*	*m*	*CEB(i)*	*CAP)*
15-19	1	198572	10876	520
20-24	2	103601	55158	5521
25-29	3	121364	113721	13226
30-34	4	108274	137593	19640
35-39	5	92758	127221	15648
40-44	6	68116	133854	21369
45-49	7	134619	288511	36555

Source: Nigerian Demographic and Heals Survey (NDHS), 1998

From the table above $P(l) = \frac{10876}{98572} = 0.1103,$

$$P(2) = \frac{55158}{103601} = 0.5324,,$$

$$P(3) = \frac{113721}{121364} = 0.9370,$$

$$P(4) = \frac{137593}{108274} = 1.2708,$$

$P(5) = \frac{127221}{92758} = 1.3715,$

$P(6) = \frac{133854}{68116}$ = /.96J,

P(7) = 2m// / *134619* *= 2.1432,*

Step 2: Calculation of Proportion of Children Dead for Each age Group of Mother:

The proportion of children dead *D(i)* is defined as the ratio of reported children dead to reported children ever born that is *D(i) = CD(i)* / *CEB(i);* where *CEB (i)* is as defined in stepl, and *CD(i)* is the number of children dead reported by women in age group *(i).*

From table 1, *D(i),* where *i*— 1,2....7 are:

$D(l) = \frac{520}{10876} = 2.1432,$

D(2) = 0.1001
D(3) = 0.1163
D(4) = 0.1427
D(5) = 0.1230
D(6) = 0.1596
D(7) = 0.1267

Step 3: Calculation of Multipliers:

Table 2, below presents the estimation equations and the necessary coefficients to estimate the multipliers, k(i). According to the Trussel Variant of the Original Brass Method. A different set of coefficients is provided for each of the four different families of model life tables in Coal-Demeny System. For this paper, the North Model Life Table is used.

Table 2: Coefficients for Estimation of Child Mortality Multipliers, Trussel Variant

Mortality model	Age group	Index	Mortality Ration *q(i)/D(i)*	Coefficients *a(i)*	*Mil*	*c(i)*
North	15-19	**1**	*Q(i)/D(i)*	1.1 19	-2.9287	0.8507
	20-24	2	*Q(2)/D(2)*	1.2390	-0.6865	-0.2745
	25-29	3	*0(3)/D(3)*	1.1884	0.0421	-0.5156
	30-34	4	*Q(4)/D(4)*	1.2046	0.3037	-0.5656
	35-39	5	*Q.(5)/D(5)*	1.2586	0.4237	-0.5898
	40-44	6	*Q(6)/D(6)*	1.2240	0.4222	-0.5456
	45-49	7	*Q(7)/D(7)*	1.1772	0.3486	-0.4624

Source: Nations Man jal X.

From Step 1:
PARI = p_i/p_2 **= 0.11**30310.5324 = 0.2072
PAR2 = p_2/p_3 = 0.5324 /0.9370 = 0.5682.

We have:

K(i) = a(i) + PARI x b(i) + PAR2 x c(i)

Therefore,

X(l) = 1.119 + (-2.9287X0.2072) + (0.8507)(0.5682) = 0.9955

K{2) = 0.9408 *K(3)* = 0.9042 AT(4) = 0.9461

*K(*5) = 0.9985 *K{*
6)= 1.0015 *K{1)*
= 0.9867

Step 4: Calculation of Reference Period t(i).

The reference period, t(i), are estimated from Table 3 of Trussel coefficients for given PARI and PAR2 using North model.

Table 3: Coefficients for Estimation of the Reference Period, t(x), to which the values of q(x) will Estimate from Data Classified by Age Refer.

Mortality model	Age group	Index	Age	Parameters to Be Estimated	Coefficients
					a(i) b(i) c(i)
North	15-19	1	1	*Q(i)*	1.119 -2.9287 0.8507
	20-24	2	2	*Q(2)*	1.2390 -0.6865 -0.2745
	25-29	3	3	*Q(V*	1.1884 0.0421 -0.5156
	30-34	4	5	*0.(4)*	1.2046 0.3037 -0.5656
	35-39	5	10	*9(5)*	1.2586 0.4237 -0.5898
	40-44	6	15	*9(6)*	1.2240 0.4222 -0.5456
	45-49	**T**-	20	*0(7)*	1.1772 0.3486 -0.4624

Source: United Nations Manual X.

From the above table, *t(x) = a(i) + b(i) x PARI +c(i) x PAR2*

Therefore,

t{ 1)= 1.0921 + (5.4732)(0.2072) - (1,9672)(0.56820) = 1.1 /(2)
= 2.5
/(3) = 6.5 1
t(4) = 7.0 *t(* 5) =
9.7 *t{* 6)= 12.5
t(7)= 15.4

Table 4 below shows the summaries of level of mortality (LM), reference period to which the mortality levels refer *t(x),* probabilities of dying and surviving xq_0 and *lx*..

Table 4: Summary of Findings

Age Group	P(i) D(i) K(i) x q(x) L(x) LM t(x)	Reference date
15-19	0.1103 0.0478 0.9955 1 0.0476 0.9524 19.6 1.1	1997
20-24	0.5324 0.1001 0.9408 2 0.0942 0.9058 16.6 2.5	1996
25-29	0.9370 0.1163 0.9042 3 0.1052 0.8948 16.1 6.5	1992
30-34	1.2708 0.1427 0.9461 5 0.1350 0.8650 15.9 7.0	1991
35-39	1.3715 0.1230 0.9985 10 0.1228 0.8772 16.0 9.7	1989
40-44	1.9651 0.1596 1.0015 15 0.1598 0.8402 15.7 12.5	1986
45-49	2.1432 0.1267 0.9867 20 0.1250 0.8750 17.8 15.4	1983

The levels of mortality (LM) in table above were calculated from the Coal-Demeny Model Life Tables using computed probabilities of surviving and a sex ratio at birth of 102, for both sexes combined. Where the level of mortality is not obtained exactly, the fractions are interpolated. For *q(x =1)* = 0.0476 and l(x =1) = 0.95240 from table 4 using North model values for probability of surviving from birth l(x), 1(1) lies between 0.94676 and 0.95562, which correspond to level 19,. Therefore, the level of mortality for age group 15-19 is 19 + (0.9524-0.94676)/(0.95562-0.94676) = 19.6 the values of *l(x)* in the table4 are obtained by *l(x) = I-xq*,,, and the value of *xq* is computed by *K(i) x D(i).*

Discussion

The data used in this paper were from the Nigerian Demographic and Health Survey, 1998. In Sub-Sahara Africa, the North families of Model Life table has been considered the most appropriate to compute the level of mortality. The level of mortality is a useful indicator of state of health and standard of society. The level of mortality is relatively high particularly in developing countries. From table 4, the implied level of mortality for q(l) is 19.6 which is higher than all the levels, because women within the age group 15-19 are young and are usually associated with birth complications. Though the levels are consistent, there mortalities are higher at the two extreme age groups. The results are in the line with the theory of mortality that infant mortality is higher than child mortality. The risk of dying of children born by women in age group 15-19 is higher than for the women in the age group 20-24. These groups of women are selective, young, and have low socio-economic status or suffer from differential mortality by birth order (higher amongst first birth) explain the apparent inconsistency. It is also possible that small number of events at the early ages especially of births and deaths might also introduce fluctuations.

The estimate of level mortality of 19.6 was one year before the survey, which refer to 1997. the levels of mortality of 16.6, 16.1, 15.9, 16.0, 15.7 and 17.8 correspond to the reference period of 1996, 1992, 1991, 1989, 1986 and 1983 respectively, and these are respectively, 1, 2, 6, 7, 9, 12 and 15 years before the survey.

Conclusion

The decline in the mortality levels was as a result of improvement in the health sectors in the country. The United Nation indirect techniques were used to estimate all the parameters computed in this paper. The infant mortality computed is lq_0, $2q_0$, $3q_0$ and $5q_0$ while the child mortality is $15q_0$ and $20q_o$. The implied infant mortality varies widely with pattern of mortality. It is suggested that $5q_0$ less affected by pattern than lq,,, $2q_0$, and $3q_0$. in table 4, it can be seen that the mean parity of older women is higher than the young ones. Though the mean parity of women aged 45-49 is higher than that of 15-19. Mortality among women aged 15-19 is higher, followed by women aged 45-49. The levels refer to different periods. The mortality level foe women level for women aged 15-19 is referring to the condition of mortality one year before the survey, while that of women aged 45-49 is referring to 15 years before the survey.

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